

Prevalence of gallstones and gallbladder disease in Canadian Micmac Indian women

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The prevalence of gallstones and gallbladder disease was studied between October 1973 and June 1976 in Canadian Micmac Indian women aged 15 to 50 years in an inland rural community near Shubenacadie, NS. Of 132 women at risk 98 underwent cholecystography, 6 had a history of cholecystectomy (verified from hospital records) and 3 had cholecystectomy because of cholecystitis during the 3 years of the study. Of the 17 abnormal cholecystograms 10 showed radiolucent gallstones, and repeated studies documented gallstones in 6 of the 7 radiographs on which the gallbladder was not visualized. The prevalence of gallstones was found to be 211/1000, and that of gallbladder disease, 240/1000. The peak prevalence was at 30 to 39 years of age. The women with gallbladder disease were significantly more obese and of greater parity than those without gallbladder disease even when age was controlled. The Micmac Indian women of Nova Scotia appear to be at a much higher risk for the development of cholesterol gallstones and gallbladder disease than Caucasian women in Framingham, Massachusetts.

Entre octobre 1973 et juin 1976 on a étudié la fréquence des calculs biliaires et autres maladies de la vésicule biliaire chez les Indiennes Micmac canadiennes âgées de 15 à 50 ans habitant une communauté rurale intérieure située près de Shubenacadie, N-E. Sur 132 femmes exposées 98 ont passé une cholangiographie, 6 ont admis à l'anamnèse avoir subi une cholécystectomie (vérifiée aux dossiers d'hôpital) et 3 ont eu une cholécystectomie à cause d'une cholécystite au cours des 3 années qu'a duré l'étude. Sur les 17 cholangiogrammes anormaux 10 ont révélé des calculs biliaires translucides aux rayons x, et des études répétées ont prouvé la présence de calculs biliaires pour 6 des 7 radiographies où la vésicule biliaire n'avait pu être mise en évidence. La fréquence des calculs

biliaires a été de 211/1000, et celle des maladies de la vésicule biliaire, de 240/1000. La fréquence la plus élevée a été observée chez les femmes de 30 à 39 ans. Les femmes souffrant de maladie de la vésicule biliaire étaient significativement plus obèses et avaient eu significativement plus de grossesses que celles qui n'en souffraient pas, même en tenant compte de l'âge. Les Indiennes Micmac de Nouvelle-Écosse semblent présenter un risque plus élevé de développer des calculs de cholestérol et des maladies de la vésicule biliaire que les Caucasiennes de Framingham, Massachusetts.

North American Indians, particularly women aged 15 to 50 years, are at high risk for the early development of gallstones. Indians in the southwestern United States have been studied the most intensively, especially the Sioux,¹ Pima²⁻⁵ and Navajos^{6,7} of Arizona and New Mexico, and recently the Chipewa tribe in Minnesota has been identified as another group at high risk.⁸ The high prevalence of gallstones has resulted in much illness.^{9,10}

In this paper we describe our study of a rural population of young Micmac Indian women in an inland community in Nova Scotia, undertaken to determine the prevalence of gallstones and gallbladder disease. We found a high prevalence of both, similar to that reported for Indians of the southwestern United States.

Methods

The population of the Micmac Indians living on a 1160-ha reservation 8 km from Shubenacadie and 80 km from Halifax was determined from the federal band list and the provincial electoral roll. Each house on the reservation was identified and visited between October 1973 and June 1976 to determine the female population thought to be at high risk for the development of gallstones and gallbladder disease — those aged 15 to 50 years. The purpose of the study was explained to the women and, with informed consent, a questionnaire on medical history, dietary habits and pain was completed. All nonpregnant subjects were offered conventional oral cholecystography with sodium tyropanoate (Bilopaque sodium). Subjects in whom the gallbladder was not visualized were

offered repeat cholecystography with a double dose of contrast medium, tomography or ultrasonography, or all three, to confirm the gallbladder status. All pregnant subjects, who initially were excluded from the study, were contacted subsequently and included in the study when possible. For subjects who had undergone cholecystectomy the pathologic findings were verified by review of the hospital medical records. Questionnaires pertaining to risk factors were completed by 22 women with gallstones and 81 women without gallstones.

Body mass index (wt/ht²), skinfold thickness, duration of overnight fast and parity (number of pregnancies lasting 7 months or more) were assessed as risk factors by means of multiple regression analysis. The duration of overnight fast was taken as a mean from a representative food record kept for 4 consecutive days. By relative risk analysis the influence of use of oral contraceptives, parity, duodenal ulcer (detected by radiography) and relatives with gallbladder disease was determined. In all analyses the covariate age was controlled. By chi-square contingency tests differences of prevalence by age group were assessed. We assumed that subjects who refused investigation were at the same risk (adjusted for age differences) for the development of gallstones and gallbladder disease as those who did not.

Analyses were performed with the Control Data Computer, series 6400, at Dalhousie University.

Results

Most of the women at risk were young; 69.7% were less than 30 years of age at the time of study and the median age of the entire group was 24.0 years.

The results of the survey for gallstones and gallbladder disease are shown in Table I. Of the 132 women at risk 6 had undergone cholecystectomy. Of the other 126, 98 (77.8%) underwent cholecystography. One of the 81 women considered to have a normal cholecystogram had a normally functioning gallbladder with a phrygian cap. Of the 10 women with radiolucent gallstones 5 were free of symptoms. In six of the seven women in whom the gallbladder was not visualized the organ was repeatedly shown to be abnormal and to contain gallstones; the other woman refused further investigation.

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Table I—Results of 1973-76 study to detect gallstones and gallbladder disease in Canadian Micmac Indian women aged 15 to 50 years

Age group (yr) and no.	Findings from cholecystography			Cholecystectomy		Investigation refused or not possible‡	Moved away
	Gallbladder normal	Gallstones	Gallbladder not visualized	Before the study*	During the study†		
15—19, n = 38	24	2	1	0	0	8	3
20—24, n = 36	24	1	1	2	0	7	1
25—29, n = 18	9	2	2	2	1	2	1
30—34, n = 17	8	3	2	1	1	2	1
35—39, n = 8	3	2	0	0	0	2	1
40—44, n = 4	4	0	0	0	0	0	0
45—50, n = 11	9	0	1	1	1	0	0
Total, n = 132	81	10	7	6	3	21	7

*All had gallstones.

†All had acalculous cholecystitis; results of cholecystography previously during the study had been normal.

‡In three women cholecystography was not done because of repeated pregnancy.

Table II—Calculation of prevalence of gallbladder disease in study population

No. of subjects at risk	132 (A)
No. with history of cholecystectomy	6 (B)
No. that underwent cholecystography	98 (C)
No. with abnormal cholecystogram (radiolucent stones or gallbladder not visualized)	17 (D)
No. without gallstones having cholecystectomy during the study	3 (E)
Estimated no. with gallbladder disease: ¹⁴ (D + E) ÷ C × (A - B) + B	31.7 (F)
Prevalence (no. per 1000 population): F ÷ A × 1000	240

Table III—Prevalence of gallstones and gallbladder disease in study population by age

Datum	Age (yr)			
	15-19	20-29	30-39	40-50
No. at risk	38	54	25	15
No. with gallstones*	3	10	8	2
No. with cholecystitis	0	1	1	1
Prevalence ± 1 SEM†/1000				
Gallstones	79 ± 44	185 ± 54	320 ± 96	133 ± 103
Gallbladder disease	79 ± 44	204 ± 52	360 ± 93	200 ± 87

*Includes six women with cholecystectomy prior to the study.

†Standard error of mean.

Table IV—Prevalence (± 1 SEM) of gallbladder disease in women by age

Age (yr)	Indians		Caucasians	
	Micmac	Pima* ⁴	Framingham Caucasians ¹¹	Appalachian Caucasians ¹²
30—39	360 (9/25) ± 96	455 (16/45) ± 71	30 (30/1013) ± 5.4	280 (5/18) ± 105
40—49	200 (3/15) ± 103	392 (20/51) ± 68	66 (60/905) ± 8.5	260 (5/19) ± 101
Total	300 (12/40) ± 72	375 (76/96) ± 49	47 (90/1918) ± 5.0	270 (10/37) ± 73

The overall prevalence of gallstones was 211/1000, and that of gallbladder disease, 240/1000 (Table II). The prevalence of each was maximal in the women aged 30 to 39 years and was significantly greater ($X^2 = 4.1387$,

$P < 0.05$) in that group than in the women aged 15 to 19 years (Table III). Other comparisons did not yield significant differences.

Comparison of 22 women with gallstones and 81 without gallstones re-

vealed that the women with gallstones were more obese according to the body mass index ($P = 0.006$) and of greater parity ($P = 0.005$). These comparisons were done after adjustments for age. (Age was significant with parity controlled but not with parity uncontrolled.) All other analyses did not reveal significant intergroup differences. None of the women had Crohn's disease, bypass of the terminal ileum or ileal resection, which are known to be associated with an increased prevalence of gallstones. Only one woman of those with gallstones had diabetes mellitus requiring medical treatment; none of those without gallstones had clinical diabetes mellitus. An anticipated inverse relation between the presence of gallstones and radiologic evidence of peptic ulcer was not found, and the two groups did not differ significantly with respect to evidence of peptic ulcer, though the numbers of women were small.

Discussion

The population of 132 Micmac Indian women in this study is smaller than those of the similar studies of Pima Indians in the southwestern United States⁴ and of Framingham (Massachusetts) Caucasians¹¹ but comparable in size to that of the Appalachian study¹² (Table IV). Nevertheless, we were able to detect significant differences in almost all the factors reported as significant in the other studies. We were able to study completely 104 (78.8%) of the women at risk; the proportions studied completely varied from 71% for the teenage group to 100% for the women over 40 years of age.

We found a high prevalence of gallbladder disease in our population of Canadian Micmac Indian women aged 15 to 50 years (240/1000). This increased risk for cholesterol gallstones is about half that found in Pima Indian

women aged 15 to 45 years (535/1000)⁵ but four times that in Caucasian women aged 30 to 62 years at entry to the Framingham study (59/1000).¹¹ The prevalence in women aged 30 to 39 years is similar in the Micmac and Pima Indian women and about 12 times that in the Caucasian Framingham women ($P < 0.01$); the prevalence in Caucasian Appalachian women aged 30 to 39 years¹² is about nine times that in the Framingham women of the same age. We found less gallbladder disease in the Micmac women aged 40 to 49 years compared with the Pima Indians and the Appalachian Caucasians, but three times more in the Micmac women compared with the Framingham Caucasians. The lower prevalence in the age group 40 to 49 years is similar to that reported in the Pima Indians and the Appalachian Caucasians; this has also been reported in a healthy group of female railway workers in India¹³ and in women in a South Wales industrial town¹⁴ and may reflect the relatively small proportion of women of this age in most of these study groups. The overall prevalence of gallbladder disease in the Micmac women does not differ significantly from the prevalence in the Pima or Appalachian groups but is significantly ($P < 0.01$) different from that in the Framingham group.

In our study the gallbladder was not visualized in 7 of the 17 abnormal cholecystograms, a proportion similar to that found by others studying Pima Indians;¹⁰ in all but 1 of the 7, gallstones were demonstrated by repeat cholecystography, tomography, ultrasonography or subsequent cholecystectomy, or a combination.

We found obesity, as judged by the body mass index, to be a significant risk factor in the women with gallstones, which confirms the reports of others.^{5,11} Body mass index proved a much better indicator of gallbladder disease than skinfold thickness. The body mass index tended to increase with age; there was a significant difference ($P < 0.05$) between the teenage and older women (those aged 30 to 39 and 40 to 49 years), but not between the groups of older women. Therefore the decrease in gallstone prevalence with age is not explicable by a decrease in obesity.

The Micmac Indian women with gallbladder disease were of greater parity than those without, which confirms the findings of the Framingham study¹¹ but is at variance with the results of the Pima Indians study.⁵ We used multiple regression analysis to assess parity as a significant risk factor. Analysis of parity by categories of 0, 1 to 4 and 5 or more pregnancies by the chi-square test was, as expected, less sensitive

($P = 0.08$). This probably explains the difference in the findings in our study and the Pima Indians study, for in the latter parity was analysed only by categories of 0, 1 to 4 and 5 or more pregnancies.

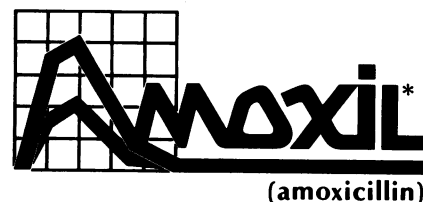
In our group of Micmac Indian women at risk for the development of gallstones, further studies on the presence of cholesterol-saturated or lithogenic bile and the influence of diet are being completed.

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